WHAT IS CLAIMED IS:

1. A method of calculating $x^{M/N}$, wherein x has a value in a range $(0, x_{max}]$ and M and N are integers, comprising the steps of:

partitioning the range $(0, x_{max}]$ into a plurality of K number of intervals $[B^{kN}, B^{(k+1)N}]$, where B > 1 and k= -1, 0, 1...K;

determining the interval $[B^{kN}, B^{(k+1)N}]$ in which x falls and deriving a value of k therefrom;

dividing x by a normalization factor B^{kN} to obtain a normalized value x';

computing a value of $x'^{(M/N)}$ for the normalized value x'; and

renormalizing by multiplying $x'^{(M/N)}$, by B^{kM} to obtain $x^{M/N}$.

2. The method of Claim 1 wherein said step of computing comprises the step of retrieving the value of $x'^{M/N}$ from a look-up table indexed by the normalized value x'.

3. The method of Claim 1 wherein $x^{M/N}$ is calculated in binary form and B is equal to 2.

4. The method of Claim 1 wherein said step of calculating comprises the step of performing a series expansion to calculate the value $x'^{(M/N)}$ for the normalized value x'.

5. The method of Claim 2 and further comprising the step of interpolating between the value $x'^{(M/N)}$ retrieved for a first quantized approximation of the normalized value x' and a second quatized approximation of the value of $x'^{(M/N)}$ retrieved for a second value of x'.

6. The method of Claim 1 wherein the method is implemented in a program executed by a digital signal processor.

7. The method of Claim 1 wherein said steps are performed using fixed point operations.

8. A method of calculating $x^{M/N}$, x having a range and M and N are integers, comprising the steps of:

partitioning the range of x into selected number of intervals;

determining the interval into which x falls;

normalizing x with a normalization factor calculated for the interval into which x falls to obtain a normalized value x' within a normalized range;

determining a value for $x'^{(M/N)}$ from x' within the normalized range; and

renormalizing by multiplying $x'^{(M/N)}$ by a renormalization factor calculated for the interval in which x falls obtain $x^{M/N}$.

9. The method of Claim 8 wherein said step of determining comprises the substeps of:

storing a plurality of values of $x'^{(M/N)}$ over the normalized range in a table; and

retrieving a value of $x'^{(M/N)}$ from the table for the normalized value x'

10. The method of Claim 8 wherein the normalization factor is B^{Kn} where B is the base in which $x^{M/N}$ is calculated and k is an index between 0 and K-1 of the interval into which x falls, the range of x divided into K number of intervals.

11. The method of Claim 8 wherein the renormalization factor is B^{kM}.

12. The method of Claim 9 and further comprising the step of retrieving a second value $x''^{(M/N)}$ corresponding to a second normalized value x" and interpolating between the retrieved value of $x'^{(M/N)}$ and the second retrieved value $x''^{(M/N)}$.

13. The method of Claim 12 wherein said step of interpolating comprises the step of linearly interpolating in accordance with the formula:

$$x'^{(M/N)} = \alpha(x'^{(M/N)}) + (1 - \alpha)x''^{(M/N)}$$

where α is an interpolation factor.

14. The method of Claim 8 wherein M > N and the method comprises the steps of factoring $x^{M_1} * x^{(M_2/N)}$, where $M = M_1 * N + M_2$ and $M_2 < N$, and calculating $x^{(M_2/N)}$.

15. The method of Claim 8 wherein said steps of normalizing and renormalizing are implemented in fixed point operations.

16. A method of calculating a value of a function f(x) for a binary input value x within an un-normalized range comprising the steps of:

shifting a received input value x by a selected number of places in a selected direction to normalized the value of x to a normalized value x' in the normalized range;

calculating a value f(x') for the function f(x) for data point x' in the normalized range; and

shifting the calculated value of x' in a selected direction to obtain the value of f(x) for the input value x.

17. The method of Claim 16 wherein $f(x) = x^{M/N}$, where M and N are integers.

18. The method of Claim 17 wherein the normalized range is selected to be $[1, B^N)$.

19. The method of Claim 16 wherein said step of calculating comprises the substeps:

storing values f(x') of the function f(x) for a set of normalized values x' over a selected normalized range in a table; and

indexing the table with part of x' and retrieving the value of f(x').

20. The method of Claim 19 wherein said step of calculating further comprises the substeps of

retrieving a second value of f(x") from the table for interpolation;

linearly interpolating between the value and second value of f(x") using a fractional part of x' as an interpolation factor to obtain an interpolated value of x';

21. The method of Claim 19 wherein said step of calculating comprises the step of calculating a value of f(x") using a series expansion.

22. A signal processing system comprising:

processing circuitry for obtaining a value for the function f(x) for an input data point x taken over an unnormalized range and operable to:

shift the input data point x by a selected number of places to normalize the value of x to a normalized data point x' in the normalized range;

calculate a value of f(x"); and

shift the value of f(x") a selected number of places to renormalize and obtain a result of f(x) over the unnormalized range for the input value x.

23. The signal processing system of Claim 22 wherein the signal processing circuitry operates on fixed point values of x and x'.

24. The signal processing system of Claim 22 wherein said processing circuitry comprises a digital signal processor.

25. The signal processing system of Claim 24 wherein said digital signal processor forms a part of an audio data processing device

26. The signal processing system of Claim 25 wherein said digital signal processor forms a part of a dual signal processor audio data processing device.